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AUTHOR Orwin, Rob; Williams, Valerie

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ABSTRACT

This study focuses on programmatic factors that predict retention for individuals in drug and alcohol treatment programs through secondary analysis of data from the National Treatment Improvement Evaluation Study (NTIES). It addresses the relationships between completion rates, lengths of stay, and treatment modality. It examines the effect of program-level factors on treatment retention. NTIES intake and treatment episode completion data for 3,117 clients across 61 service delivery units were used in the study. Data were organized into eight analysis cells defined by treatment modality and intended length of stay. Results show that, in general, shorter programs have higher treatment episode completion rates but longer programs retain clients for longer periods. Long-term residential programs exhibit higher treatment episode completion rates than long-term outpatient or correctional programs. The median length of stay for clients in long-term or correctional programs with intended lengths of treatment of 120 days or more were lower than in the 90-119 day programs, suggesting that setting the intended length of treatment at 120 days or more may be counterproductive with respect to retaining clients. Implications for research, policy, and practice are discussed. An appendix provides a description of the National Treatment Improvement Evaluation Study and Center for Substance Abuse Treatment Demonstrations (1990-1992). (Contains 12 tables and 24 references.) (MKA)

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NATIONAL EVALUATION DATA SERVICES

THE NATIONAL TREATMENT IMPROVEMENT EVALUATION STUDY: RETENTION ANALYSIS

Prepared by

Rob Orwin and Valerie Williams

Battelle Centers for Public Health Research and Evaluation (CPHRE)
2101 Wilson Boulevard, Suite 800
Arlington, VA 22201

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FOREWORD

CSAT works to improve the lives of those affected by alcohol and other substance abuse, and, through treatment, to reduce the ill effects of substance abuse on individuals, families, communities, and society at large. Thus, one important mission of the Center for Substance Abuse Treatment (CSAT) is to expand the knowledge about and the availability of effective substance abuse treatment and recovery services. To aid in accomplishing that mission, CSAT has invested and continues to invest significant resources in the development and acquisition of high quality data about substance abuse treatment services, clients, and outcomes. Sound scientific analysis of this data provides evidence upon which to base answers to questions about what kinds of treatment are most effective for what groups of clients, and about which treatment approaches are cost-effective methods for curbing addiction and addiction-related behaviors.

In support of these efforts, the Program Evaluation Branch (PEB) of CSAT established the National Evaluation Data Services (NEDS) contract to provide a wide array of data management and scientific support services across various programmic and evaluation activities and to mine existing data whose potential has not been fully explored. Essentially, NEDS is a pioneering effort for CSAT in that the Center previously had no mechanism established to pull together databases for broad analytic purposes or to house databases produced under a wide array of activities. One of the specific objectives of the NEDS project is to provide CSAT with a flexible analytic capability to use existing data to address policy-relevant questions about substance abuse treatment. This report has been produced in pursuit of that objective.

Participant retention in alcohol and other substance abuse treatment programs is an important outcome that has been found to be a mediator of subsequent client-level outcomes such as reduced alcohol and other drug use, residential stability, and economic security. The analysis reported here focused on programmatic factors that predict retention through a secondary analysis of data from the National Treatment Improvement Evaluation Study (NTIES). (The appendix to this report contains a summary description of NTIES.) For policy planners and treatment providers, results of the analyses show that service delivery unit (SDU)-level factors, such as whether the client reported seeing their treatment plan, providing vocational training, the use of staff specifically designated as case managers, and providing services tailored to populations defined by specific characteristics (e.g., homeless, pregnant, etc.) clearly increase the odds of program completion, after controlling for client-level factors. In addition, lower

retention rates for programs with intended durations of 120 days or more implies shorter (e.g., 90 days), more intensive programs may be more successful.

Sharon Bishop
Project Director
National Evaluation Data Services

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For further information about NTIES,
please contact the NEDS Analysis Group
(703) 385-3200

EXECUTIVE SUMMARY

1. INTRODUCTION

Participant retention in alcohol and other drug abuse treatment programs is an important outcome to policy makers, program administrators, and program staff and has been found to be a mediator of subsequent client-level outcomes such as reduced alcohol and other drug use, housing stability, and economic security gains post-treatment. Reviews of the treatment retention literature reveal that investigators have most often focused on identifying participant characteristics that predict retention (De Leon, 1991; Moos, Finney, & Cronkite, 1990; Stahler, Cohen, Shipley, & Bartlet, 1993). However, the literature has shown the predictive power of participant characteristics to be relatively weak and inconsistent (DeLeon, 1991; Stahler et al., 1993; Kleinman et al., 1992).

The present study focused on programmatic factors that predict retention through a secondary analysis of data from the National Treatment Improvement Evaluation Study (NTIES). The study addressed the relationships between completion rates, lengths of stay, and treatment modality and examined the effect of program-level factors on treatment retention. A summary description of the study is provided in the Appendix to the report.

2. METHODS

NTIES intake and treatment episode completion status data for 3,117 clients across 61 SDUs (services delivery units) were used in the study. The data were organized into eight analysis cells defined by treatment modality (non-methadone outpatient, correctional, short-term residential, long-term residential) and intended length of stay (21-30 days, 41-89 days, 90-119 days, 120 days or more) so that subsets of clients that might differ significantly in terms of treatment program type could be considered separately.

Three types of contrasts were chosen:

- Comparisons within modality across intended length of treatment strata
- Cross-modality comparisons within intended length of treatment strata
- Comparison of short-term residential (21 to 30 days of intended treatment) to long-term residential (120 or more days of intended treatment).

For each of the eight analysis cells, chi-square tests of independent proportions were carried out, comparing treatment episode completion rates across cells for pre-specified contrasts. Mean LOS values for each cell were then compared across cells for the same contrasts. Logistics regression methods were used to investigate which factors predict completion of treatment within each of the eight analysis cells.

3. RESULTS

The descriptive comparisons of completion rates and median lengths of stay for the eight analysis cells revealed that:

- In general, shorter programs have higher treatment episode completion rates but longer programs retain clients for longer periods
- Long-term residential programs exhibit higher treatment episode completion rates than long-term outpatient (non-methadone) or correctional programs
- The median length of stay for clients in long-term outpatient (non-methadone) or correctional programs with intended lengths of treatment of 120 days or more were lower than in the 90-119 day programs, suggesting that setting the intended length of treatment at 120 days or more may be counterproductive with respect to retaining clients.

The results of the logistic regression analyses showed that SDU-level factors, such as whether the client reported seeing their treatment plan, providing vocational training, the use of staff specifically designated as case managers, and providing services tailored to populations defined by specific characteristics (e.g., homeless, pregnant, etc.) clearly increase the odds of program completion, after controlling for client-level factors. Whether the client reported seeing their treatment plan is by far the most predominant predictor of treatment completion, found to be significant in all of the models in which it was included. The predominance of this effect across analysis cells suggests that engaging the client in the treatment plan development process may be an important determinant of treatment completion.

4. IMPLICATIONS FOR RESEARCH, POLICY, AND PRACTICE

Possibilities for further analyses using the NTIES data set include:

- An investigation of interactions between client level variables and SDU-level variables
- A closer look at those clients who drop out in order to develop profiles of "early" and "late" leavers
- More focus on why clients leave programs
- Investigation of patterns in terms of when people leave their programs
- Investigations that relate treatment episode completion and treatment outcomes (reduced substance abuse, etc.).

Implications for policy that can be drawn from these results are:

- Consideration should be given to developing an intensive, moderate-length (about 90 days) residential program since our findings show lower retention and completion for excessively long intended treatment (120 days or more).
- Case management can affect retention and completion but needs further study.

An implication for treatment practice that can be drawn from these results is that showing a client his or her treatment plan can have a positive effect on completion and retention.

I. INTRODUCTION

1. STATEMENT OF PROBLEM

"How important is the matching of client services to perceived client need on retention in substance abuse treatment?" was one of the sample questions asked by CSAT in the original Statement of Work for the NEDS contract. In fact, matching is but one of many factors of interest when assessing what influences retention. Participant retention in alcohol and other drug abuse treatment programs is an important outcome to policy makers, program administrators, and program staff and has been found to be a mediator of subsequent client-level outcomes such as reduced alcohol and other drug use, residential stability, and economic security. To the degree these outcomes will be attained more successfully if participants stay in their treatment programs (as well as longer-term community-level outcomes such as reduced utilization of expensive and inappropriate services, lowered crime rates, higher productivity, etc.), then further study of the relationship between retention and treatment is clearly warranted. And numerous studies have in fact reported an association between retention in treatment and client outcome (Baekeland & Lundwall, 1975; De Leon, 1991; Hser, Angler, & Liu, 1991; McKusker, Stoddard, Frost, & Zorn, 1996; Stahler et al., 1993; Stark & Campbell, 1988).

However, the relationship between retention and successful outcomes can often reflect self-selection factors rather than (or in addition to) the treatment experience (De Leon, 1991; Moos et al., 1990). Reviewers of the treatment retention literature note that investigators have most often focused on identifying participant characteristics that predict retention (De Leon, 1991; Moos et al., 1990; Stahler et al., 1993). In part, this is because analysts can use participant characteristics to (in theory at least) "control for" the self-selection problem (see, for example, Moos et al., 1990). There is also a more practical reason: participant characteristics are typically easier to measure than potentially important programmatic predictors such as, for example, treatment milieu. In any case, the literature has shown the predictive power of participant characteristics to be relatively weak and inconsistent (DeLeon, 1991; Stahler et al., 1993; Kleinman et al., 1992). One particularly stark example, an article in the 1991 volume of the *International Journal of the Addictions*, found that participants with a history of depression were significantly more likely to stay in treatment (Agosti, Nunes, Stewart, & Quitkin, 1991). This is remarkable only because an article in a subsequent issue of the same volume found that participants with depression histories were less likely to stay in treatment (Williams & Roberts, 1991). Similar inconsistencies were found across sites in two multi-site evaluations which examined retention of homeless persons in treatment (Orwin et al., 1994; R.O.W. Sciences, 1995). Orwin et al. (1994) identified several potential reasons; these included differences in target populations, differences in the interventions, differences in retention policies, and

differences in the definition of dropout. The only characteristic that seems to predict retention with any consistency is whether treatment was court mandated as a condition of avoiding prison (De Leon, 1991; Gallant, Bishop, & Faulkner, 1968; Rosenberg & Liftik, 1976; Stark & Campbell, 1988) or receiving public assistance (Brizer, Maslansky, & Galanter, 1990). Court-mandated participants are typically retained at higher rates, but often only over the short run (e.g., < 30 days).

As noted by Stahler et al. (1993), if the implicit goal of modeling participant characteristics is to better understand how to retain clients in treatment programs, then an alternative strategy for achieving this goal is to learn why they left, i.e., what precipitated their exit. De Leon (1991) has also noted that client reasons for dropout offer considerations for how programs could modify their service delivery to improve retention, and are therefore responsive to programmatic needs. Lewis and Ross (1984) further emphasize this point, and add that there should be more focus on the "when" of dropout as patterns in the timing of this event may provide information programs could use to develop and target strategies that engage clients during critical periods. In a similar vein, Stark and Campbell (1988) argued that retention researchers must be more responsive to the needs of treatment providers and their clients to recognize, cope with, and better understand the conditions that precipitate dropout. They went on to suggest that with sufficient information from researchers, dropout prevention—like relapse prevention—might profitably become a standard operating procedure in the treatment of substance abuse. Orwin et al. (1998) emphasized a similar theme in their retention analyses of interventions from the 14-site NIAAA Cooperative Agreement program for homeless substance abusers. That study focused on (1) service components related to retention, (2) the importance of attending to phase transitions in preventing dropout, and (3) the importance of being programmatically responsive to the reasons clients leave prior to completion.

2. THE PRESENT STUDY

The present study also focuses on programmatic factors. It presents the results of a secondary analysis of data from the National Treatment Improvement Evaluation Study (NTIES). The NTIES project was a five-year longitudinal study of the impact of substance abuse treatment on a total of 5,388 clients purposively sampled from public substance abuse treatment programs (service delivery units or SDUs) that were funded by the Center for Substance Abuse Treatment (CSAT)[1]. (A summary description of the NTIES study is contained in the Appendix to this report.) The NTIES data set affords an excellent opportunity to examine the effects of

[1] CSAT defines an SDU as a single treatment modality provided at a single site.

programmatic influences on retention because of the large array of SDU-level variables that were collected from program directors in the NTIES Baseline Administrative Report (NBAR). This analysis will augment the analyses from the original NTIES report (NORC, 1997) by developing more comprehensive prediction models that utilize both SDU-level and client-level variables. Specifically, it will use the client-level variables to control for the effects of participant characteristics (case mix) and make greater use of the wide range of SDU-level variables available from the NBAR to identify programmatic influences. Because client-level variables have been the focus of so much study, new gains in knowledge about best practices for increasing retention in drug treatment may come from a greater focus on SDU-level characteristics.

3. STUDY QUESTIONS

This study addressed the following specific questions:

- How do treatment episode completion rates and actual lengths of stay compare for SDUs with different intended lengths of stay within the same modality?
- How do treatment episode completion rates and actual lengths of stay compare for SDUs from different modalities within the same intended length of stay?
- What program-level factors appear to improve retention, and by how much?
- To what degree does the inclusion of program-level factors improve overall model fit over and above client-level factors alone?
- How do the above relationships vary by modality and intended length of stay?
- What are the implications for future research and the treatment community?

II. METHODOLOGY

This section describes the selection of analysis cells and contrasts, the final sample, and the statistical techniques used in the analysis.

1. SELECTION OF ANALYSIS CELLS AND CONTRASTS

The first step in the analysis involved organizing the NTIES data in a way that would allow those subsets of clients that might differ significantly in terms of treatment program type (treatment modality and intended length of treatment) to be considered separately. Clients who participated in treatment at SDUs that provided methadone maintenance programs were excluded from this analysis because (1) the intended duration of treatment in such programs is generally an indefinite period of time and (2) there is no completion event to analyze. Exhibit II-1 shows treatment modality stratified by intended length of treatment in days. Cells containing patients from only one SDU were excluded in order to avoid the undue influence of a single SDU on the results. Two intended length of treatment strata (41-60 days and 61-89 days) for correctional SDUs were combined because the patients in each cell represented only one SDU and no other modality reported either of these time intervals. A total of 8 cells were considered in this analysis. These cells included: 90 to 119 days non-methadone outpatient, 120 days or more non-methadone outpatient, 21 to 30 days short-term residential, 120 days or more long-term residential, 21 to 30 days correctional, 41 to 89 days correctional, 90 to 119 days correctional, and 120 or more days correctional.

Three types of contrasts were chosen for this analysis. The first type of contrast consisted of comparisons within modality across intended length of treatment strata and included: 90 to 119 day non-methadone outpatient versus 120 days or more non-methadone outpatient; and 21 to 30 days correctional versus 41 to 89 days correctional versus 90 to 119 days correctional versus 120 or more days correctional. The second type of contrast consisted of cross-modality comparisons within intended length of treatment strata and included: 90 to 119 days outpatient versus 90 to 119 correctional; 120 or more days outpatient versus 120 or more days long-term residential versus 120 or more days correctional; and 21 to 30 days short-term residential versus 21 to 30 days correctional. The final type of contrast consisted of a comparison of short-term residential (21 to 30 days of intended treatment) to long-term residential (120 or more days of intended treatment).

EXHIBIT II-1

CLIENTS AND SDUS WITH INTENDED LENGTH OF TREATMENT DATA BY TREATMENT MODALITY

	TREATMENT MODALITY				
	Non-methadone Outpatient	Short-term residential	Long-term residential	Correctional Facility	Total
Number of SDUs from which the 4,411 clients with follow-up data were drawn	31	7	17	9	64
Total number of clients drawn from these SDUs	1566	873	841	709	3989
Number of SDUs with intended length of treatment data (NBAR)	24	6	15	9	54
Total number of clients drawn from these SDUs	1283	832	725	709	3549
Number of SDUs with 6-11 days intended length of treatment	0	1	0	0	1
Number of SDUs with 12-20 days intended length of treatment	0	0	0	0	0
Number of SDUs with 21-30 days intended length of treatment	0	4	0	2	6
Number of SDUs with 31-40 days intended length of treatment	1	0	0	0	1
Number of SDUs with 41-60 days intended length of treatment	0	0	0	1	1
Number of SDUs with 61-89 days intended length of treatment	0	0	0	1	2
Number of SDUs with 90-119 days intended length of treatment	7	0	1	2	10
Number of SDUs with 120+ days intended length of treatment	16	1	14	3	34

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2. DESCRIPTION OF SAMPLE FOR ANALYSIS

Both intake (NRIQ) and follow-up data (NTIES Post-discharge Assessment Questionnaire—NPAQ) are available for a total of 4,411 clients in the NTIES data set. Only 61 of the 71 SDUs from which the 4,411 participants were drawn have Baseline Administrative Forms (NBAR). This subset was used as a starting point because information on treatment completion status (TXCOMPL) was available only for these clients.[2]

Several exclusions were made from this initial subset of clients. Data on a total of 3,117 clients were available for analysis after the following exclusions were made. Those clients for whom NBAR data were unavailable were excluded because intended length of treatment (B242) and treatment modality (CELL2) are key SDU-level variables in this analysis. Limiting the analysis to these clients reduces the sample size to 3,960. Further limiting the analysis to those clients drawn from SDUs that provided information on intended length of treatment reduces the sample size to 3,549. In restricting the analysis to the 8 cells previously mentioned, the following clients were excluded: 16 non-methadone outpatient clients from the 31-40 day stratum; 382 short-term residential clients (213 in the 6-11 day stratum and 169 in the 120 or more days stratum); and 34 clients in the long-term residential 90-119 day stratum (total excluded=432).

3. STATISTICAL ANALYSIS

3.1 Descriptive Comparisons

For each of the 8 analysis cells, descriptive statistics were computed for the variables treatment completion status (TXCOMPL) and length of stay (LOS) . Chi-square tests of independent proportions were carried out, comparing completion rates across cells for pre-specified contrasts. Mean LOS values for each cell were then compared across cells for the same contrasts.

3.2 Construction of Prediction Models

Logistic regression methods were used to investigate which factors predict completion of treatment within each of the eight analysis cells. The models used for predicting treatment completion status were developed using SAS® PROC LOGISTIC DESCENDING (SAS

[2] TXCOMPL was constructed by NORC based on multiple data sources and best available evidence on each client.

Institute, 1990). The LOGISTIC procedure fitted the multiple logistic regression models to the binary dependent variable TXCOMPL (1=treatment completed, 0=treatment not completed) using the maximum likelihood method. Maximum likelihood estimation gives the unique set of estimates of all possible sets of values that could describe the population from which the sample came and is most likely to give rise to the observed data.

The regression coefficient in a logistic regression model indicates the effect of a variable on the log odds of the outcome when all other variables in the model are held constant. The coefficient shows the magnitude of the increase or decrease in the log odds produced by one unit of change in the value of the independent variable whose coefficient is being observed. To obtain the odds ratio for a binary coded variable, the following formula is used: e^{β}. In all logistic models constructed in this analysis, the probability that the dependent variable, treatment completed, =1 was tested.

Exhibit II-2 describes the client-level predictors that were entered into each of the logistic regression models. These background variables are very similar to those used by NORC in their multiple regression outcome analyses. Each of these variables had shown a significant bivariate relationship with one or more of the treatment outcomes (post-discharge drug use, alcohol use, crime activities, psychiatric problems, medical problems and employment problems severity scales) considered by NORC in their analyses.

SDU-level independent variables were then selected for inclusion in the logistic regression models. In the first step of this selection process, we carried out exploratory data analysis of the NBAR variables in order to determine the number of missing values and degree of variation exhibited by these variables within each analysis cell. Several exclusions were made after reviewing the results of this exploratory analysis. NBAR variables missing 30 percent or more of their values were excluded from analysis as were variables exhibiting no variation.

More than 35 percent of the values for one NBAR variable of interest, "formal treatment plan developed," were missing for five of the eight analysis cells and this variable exhibited no variation in the remaining three analysis cells. The treatment plan is considered an essential component of substance abuse treatment and the development and periodic update of such a plan, with the knowledge of the individual client, are generally required for funding (Hubbard, et al. 1989). In order to include some measure of the existence of a treatment plan, a client-level variable from the NTIES Treatment Exit Questionnaire (NTEQ), "patient saw treatment plan,"

EXHIBIT II-2
DEPENDENT AND BACKGROUND VARIABLES USED IN LOGISTIC REGRESSION MODELS

DEPENDENT VARIABLE	
Description	**Data Source(s):**
Treatment Completion Status	Split from Treatment (TXCOMPL - Analysis file)
BACKGROUND VARIABLES	
Description	**Data Source(s):**
Age	Age from Birth Date (R34 - NRIQ)
Race/Ethnicity	Race (R44 - NRIQ)
Hispanic	Hispanic Origin (R43 - NRIQ) Languages Spoken (R47 - NRIQ) Language Preferred (R50 - NRIQ)
Gender	Gender (R29 - NRIQ)
Years of Education	Highest Grade Attended (R58 - NRIQ)
Prior Treatment Episode	Prior Alcohol Treatment (R255 - NRIQ) Prior Drug Treatment (R256 - NRIQ)
Legal Pressure to Seek Treatment	Drug Treatment Required (R373 - NRIQ)
Pre-treatment Drug Use Severity Scale	RDRUSEV - Analysis File
Pre-treatment Alcohol Use Severity Scale	RALCSEV - Analysis File
Pre-treatment Crime Activities Severity Scale	RCRMSEV - Analysis File
Pre-treatment Psychiatric Problems Severity Scale	RPSYSEV - Analysis File
Pre-treatment Medical Problems Severity Scale	RMED SEV - Analysis File
Pre-treatment Employment Problems Severity Scale	REMPSEV - Analysis File
Primary Drug	In Treatment for "..." (R113M1 through M13 - NRIQ)

was considered in the independent variable screening process. The wording of the NTEQ question (T153) is "while you were at the program, did you see a treatment plan or a list of treatment goals?" The text that precedes this item describes what might constitute a plan but does not distinguish whether the plan was formalized or not (a plan 'can include things such as

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report of whether he/she saw a treatment plan is not a proxy for the formal treatment plan item, it can serve as an indication of the priority the SDU placed on treatment planning during the client's stay and thus as a program-level variable that may distinguish completers from non-completers.

After applying the exclusion criteria, the remaining NBAR variables were analyzed by treatment completion status. In this bivariate analysis, data from categorical NBAR variables were cross-tabulated and chi-square test statistics were used to investigate relationships between variables. Pearson correlation coefficients were used to investigate relationships between data from continuous NBAR variables and treatment completion status. This bivariate analysis was carried out within each of the analysis cells. Variables found to be significantly associated with treatment completion status within an analysis cell were then added to the logistic regression model for that cell. In order to investigate whether this bivariate screening process was excluding independent variables that might be related to the dependent variable in a multivariate context (suppression effects), SDU-level variables that were correlated with TXCOMPL in any one of the analysis cells were included in the logistic regression models of all cells.

After checking for suppression effects, a sensitivity analysis was conducted as a way to assess the "robustness" of the results. This sensitivity analysis consisted of recomputing the denominator of non-completers used in the regression models. In order to do this, clients in all 8 analysis cells were categorized in terms of discharge status using the NPRF item 'reason for discharge' (F18A) and the NTEQ item 'patient's reasons for ending treatment' (T233A1-A3). Clients' reasons for ending treatment were used to categorize some of the data that were labeled missing for the NPRF reason for discharge variable. In the sensitivity analysis, only those clients who could be classified as having had definite negative exits from treatment (did not complete treatment by patient's choice, did not complete treatment by administrative choice, did not complete treatment unclear by whose choice) were included as non-completers in the within-cell logistic regression models.

After the SDU-level variables were added to the regression models, the improvements in model fits were assessed using several goodness-of-fit measures. The first of these measures is often called "model improvement" and uses the -2*LL* (-2 times the log of the likelihood) of the model. It is customary to use -2 times the log of the likelihood since the likelihood is a small number less than 1. A good model is one that results in a high likelihood of the observed results which translates into a small value for -2*LL*. "Model improvement" represents the change in -2*LL* between successive steps of building the model and it tests the null hypothesis that the coefficients for the variables added at the last step are 0. This test is comparable to the *F*-change

test in multiple regression and the degrees of freedom are the difference between the number of parameters in the two models being compared. In this analysis, the -2*LL* values of regression models containing only the background variables are compared to the -2*LL* values obtained from models that include both the background variables and the SDU-level variables.

The second goodness-of-fit measure uses classification table comparisons of predictions to observed outcomes. Specifically, these measures include percent correct, sensitivity, specificity, false positive rate, and false negative rate. Percent correct is the number of outcomes that were correctly predicted by the model. Sensitivity is the ratio of the number of correctly classified events (completers) divided by the total number of events. Specificity is the ratio of the number of correctly classified nonevents divided by the total number of nonevents (non-completers).

The third goodness-of-fit measure, the adjusted coefficient of determination, uses the formula $R^2_{adj} = R^2/R^2_{max}$ (where $R^2 = 1 - [L(0)/l(\beta)]^{2/n}$ and $R^2_{max} = 1 - [L(0)]^{2/n}$) and is comparable to the coefficient of determination used in general linear models. The final measure used to assess model fit is the percentage of concordant observations. This measure represents the proportion of the total observation pairs (all pairs of observations comprised of one completer and one non-completer) in which the completer has a higher probability of being classified as such than the non-completer. A model with a higher proportion of concordant observation pairs has better predictive ability than a model with a lower proportion of such pairs.[3]

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[3] We had originally proposed using survival and hazard analysis techniques to analyze length of stay. The rationale was that dichotomization of the dependent variable (e.g., completion versus non-completion) wastes information by ignoring the continuous nature of the time dimension, that is, how long do participants stay before they exit and what participant characteristics affect their length-of-stay. Sometimes called failure-time models, these techniques have been used in the evaluation of drug treatment programs when the outcome of interest is time-based (e.g., time to relapse, time to arrest) (Fisher and Anglin, 1987). They are applicable in retention analyses where the outcome is time to dropout if the programs are of fixed length and program completion can be conceptualized as the absence of non-completion during the intervention period. In this case, program completers are censored cases, because the analyst cannot know how long the client would have stayed in program had the intervention period been longer. These conditions have applied in other analyses of length of stay (e.g., Orwin et al., 1998), but did not apply here for three reasons. First, interventions were not of fixed length. In some programs defined as long-term, for example, some clients still completed their programs in as little as 3 days. Second, program completion was not the absence of a non-completion event, but often the presence of a *completion* event (e.g., follows treatment plan, remains clean for a certain length of time, etc.). Third, the LOS distribution of completers and non-completers were highly overlapping, indicating that completion events routinely occurred long before non-completion events. Under these conditions, it would have been inappropriate to define completers as censored, and equally inappropriate to apply survival and hazard analysis to the LOS data. Consequently, these plans were dropped and the multivariate analyses were focused on program completion rather than LOS.

III. RESULTS

This chapter presents the results of descriptive comparisons across analysis cells and within-cell logistic regressions.

1. DESCRIPTIVE COMPARISONS

Exhibit III-1 presents reasons for discharge across the 8 cells of interest. As shown, the distributions of the reasons for discharge from the NTIES treatment episode varied across modalities. The 120 days or more non-methadone outpatient and long-term residential cells exhibited the highest percentages of clients whose reasons for discharge were attributed to patient choice. The correctional analysis cell in this stratum exhibited the highest percentage of clients whose reasons for discharge were attributed to administrative choice.

Exhibit III-2 shows the sample size, number and proportion of clients who completed treatment, median LOS, and LOS range for each of the 8 cells considered in the analysis. Several patterns are apparent in these descriptive data. First, completion rates are lowest for the cells in the longest intended length of treatment stratum across all four modalities. Second, completion rates in the correctional modality tend to decrease as length of intended treatment increases. Finally, the median lengths of stay and the completion rates for the 120 days or more non-methadone outpatient cell and the 120 days or more correctional cell are lower than the median lengths of stay and the completion rates for the cells in the corresponding modality in the 90-119 day intended length of treatment stratum. A comparison of the LOS ranges shows a high degree of overlap for all of the cells considered in the analysis.

Exhibit III-3 presents the results of descriptive comparisons across analysis cells for the pre-specified contrasts. For all of the comparisons of completion rates within modality and across intended length of treatment strata, analysis cells with shorter intended lengths of treatment had significantly higher completion rates ($p<0.001$) than cells with longer intended lengths of treatment. In terms of mean LOS, only the correctional cells differed significantly from each other.

Only one of the three cross-modality comparisons of completion rates within intended length of treatment strata yielded statistically significant results. Those analysis cells in the 120 days or more intended length of treatment stratum differed significantly from each other in terms of completion rates, with the long-term residential cell exhibiting the highest rate. The mean lengths of stay for the non-methadone outpatient cell was significantly higher than the long-term

EXHIBIT III-1
REASONS FOR DISCHARGE ACROSS CELLS OF INTEREST

	MODALITY AND INTENDED LENGTH OF TREATMENT							
	Non-methadone Outpatient		Short-term Residential	Long-term Residential	Correctional Facility			
REASON FOR DISCHARGE	90-119 days	120+ days	21-30 days	120+ days	21-30 days	41-89 days	90-119 days	120+ days
Treatment completed	42.4%	27.8%	84.4%	39.4%	88.9%	94.5%	51.6%	22.0%
Treatment not completed—patient's choice	16.3%	38.3%	8.4%	36.6%	0.9%	0	0.8%	5.4%
Treatment not completed—administrative choice	12.3%	14.8%	5.1%	11.4%	2.8%	1.6%	0.8%	19.1%
Treatment not completed—unclear by whose choice	15.5%	7.1%	1.3%	4.6%	0	0	0	1.2%
Treatment not completed—referred to another program	4.0%	4.4%	0	2.7%	0.9%	1.6%	0.8%	14.9%
Treatment not completed—incarcerated	3.7%	2.7%	0	1.3%	0.5%	0	12.1%	0.4%
Treatment not completed—patient deceased	0.3%	0.1%	0	0	0	0	0	0
Treatment not completed—other reason for discharge	4.3%	3.4%	0.4%	3.3%	5.5%	1.4%	28.2%	35.7%
Treatment not completed—missing discharge and/or T233A1	1.2%	1.4%	0.4%	0.7%	0.5%	0.9%	5.7%	1.2
Totals	349	918	918	691	217	127	124	241

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EXHIBIT III-2

DESCRIPTIVE INFORMATION ON TREATMENT COMPLETION AND LENGTH OF STAY FOR ANALYSIS CELLS

INTENDED LENGTH OF TREATMENT (B242 - NBAR)	NON-METHADONE OUTPATIENT	SHORT-TERM RESIDENTIAL	LONG-TERM RESIDENTIAL	CORRECTIONAL FACILITY
21-30 days		*n*=450 380 (84.4%) clients completed treatment median LOS = 28 days LOS range = 1-449 days		*n*=217 193 (88.9%) clients completed treatment median LOS = 28 days LOS range = 1-110 days
41-89 days				*n*=127 120 (94.5%) clients completed treatment median LOS = 54 days LOS range = 1-341 days
90-119 days	*n*=349 148 (42.4%) clients completed treatment median LOS = 98 days LOS range = 1-466 days			*n*=124 64 (51.6%) clients completed treatment median LOS = 96.5 days LOS range = 1-390 days
120 days or more	*n*=918 255 (27.8%) clients completed treatment median LOS = 96.5 days LOS range = 1-594 days		*n*=691 272 (39.4%) clients completed treatment median LOS = 85 days LOS range = 1-574 days	*n*=241 53 (22.0%) clients completed treatment median LOS = 85 days LOS range = 1-345 days

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EXHIBIT III-3
DESCRIPTIVE COMPARISONS OF TREATMENT COMPLETION RATES WITHIN ANALYSIS CELLS

CONTRASTS	RESULTS	
	Completion Rates	**Mean Length of Stay**
Non-methadone outpatient with 90-119 days of intended treatment versus non-methadone outpatient with 120 or more days of intended treatment	42.4% versus 27.8% X^2 with 1 DF = 24.95 $p<0.001$	115.5 days versus 121.2 days t with 792 DF = -1.00, n.s.
Correctional with 21-30 days of intended treatment versus correctional with 41-89 days of intended treatment versus correctional with 90-119 days of intended treatment versus correctional with 120 or more days of intended treatment	88.9% versus 94.5% versus 51.6% versus 22% Spearman Rank Correlation $r_{ranks} = -0.60$ $p<0.001$	28 days versus 67.8 days t with 342 DF =-10.94 $p<0.0001$ 67.8 days versus 110.5 days t with 249 DF =-5.28 $p<0.0001$ 110.5 days versus 93.4 days t with 363 DF = 2.32 $p<0.02$ 28 days versus 110.5 days t with 339 DF =-15.91 $p<0.0001$ 28 days versus 93.4 days t with 456 DF =-15.36 $p<0.0001$ 67.8 days versus 93.4 days t with 366 DF =-4.00 $p<0.0001$
Non-methadone outpatient with 90-119 days of intended treatment versus correctional with 90-119 days of intended treatment	42.4% versus 51.6% X^2 with 1 DF = 3.14 n.s.	115.5 days versus 110.5 days t with 471 DF = 0.58, n.s.
Non-methadone outpatient with 120 days or more of intended treatment versus long-term residential with 120 days or more of intended treatment versus correctional with 120 or more days of intended treatment	27.8% versus 39.4% versus 22.0% X^2 with 2 DF = 35.87 $p<0.001$	121.2 days versus 102.2 days t with 1607 DF = 4.02 $p<0.0001$ 102.2 days versus 93.4 days t with 930 DF = 1.46, n.s. 121.2 days versus 93.4 days t with 1157 DF = 4.09 $p<0.0001$
Short-term residential with 21-30 days of intended treatment versus correctional 21-30 days of intended treatment	84.4% versus 88.9% X^2 with 1 DF = 2.44 n.s.	28.2 days versus 28 days t with 660 DF = 0.16, n.s.
Short-term residential with 21-30 days of intended treatment versus long-term residential with 120 or more days of intended treatment	84.4% versus 39.4% X^2 with 1 DF = 226.16 $p<0.001$	28.2 days versus 102.2 days t with 834 DF =21.68 $p<0.0001$

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residential cell ($p<0.0001$). However, the long-term residential cell and the correctional cell did not differ significantly in terms of length of stay.

The results of the final contrast, the comparison of the two residential analysis cells, indicated that the short-term residential cell exhibited a significantly higher completion rate relative to the long-term residential cell ($p<0.001$). These two cells also differed significantly in terms of LOS with the long-term residential cell exhibiting a significantly higher mean LOS ($p<0.0001$).

2. LOGISTIC REGRESSION

Exhibits III-4, III-5, and III-6 present the results of the within-cell logistic regression models. Client's recollection of seeing their treatment plans yielded a positive and significant parameter estimate in all of the models in which it was included. Providing vocational training was also positive in several cells—the short-term residential cell and the 120 days or more non-methadone and long-term residential cells—but was significant only within the two long-term cells. The use of staff specifically designated as case managers yielded positive parameter estimates in both of the long-term cell models in which it was included but was significant only within the non-methadone outpatient cell. The correctional modality cells in the 21-30 day and 41-89 day intended length of treatment strata are not represented in Exhibit III-6 because no significant zero-order correlations were found within these cells between the dependent variable and any of the SDU-level independent variables considered in the analysis. The one SDU-level variable included in the logistic regression model for the 90-119 day correctional analysis cell, 'percentage of staff of ethnic or racial minority', yielded a positive but nonsignificant parameter estimate.

Overall, the model for the non-methadone outpatient cell in the 120 days or more stratum had the most significant predictors. Within this cell, having case managers and providing services tailored to populations defined by specific characteristics (e.g., homeless, pregnant, etc.) significantly increased the odds of treatment completion. The only SDU characteristic which significantly decreased the odds of treatment completion was patients requesting revisions to their treatment plans as a way in which clients participate in the development of their plans. This finding warrants further investigation.

Model improvement tests using -2*LL* differences showed that all of the models with background variables plus independent variables represented significant improvements over the

EXHIBIT III-4
WITHIN-CELL LOGISTIC REGRESSION MODELS

NON-METHADONE OUTPATIENT

Intended Length of Treatment	Independent Variables Included in the Model	Model Fit
90-119 days	average length of individual counseling sessions (B264) OR=0.98 patient saw treatment plan OR=3.31 (1.45,7.57)**	model improvement (model 1- model 2): 438.29 -309.40 = 128.89, DF=2, p<0.0001 % correct (model 1, model 2) - 60.2, 59.1 sensitivity (model 1, model 2) - 56.8, 73.2 specificity (model 1, model 2) - 62.7, 44.8 false+rate (model 1, model 2) - 47.2, 42.6 false - rate (model 1, model 2) - 33.7, 37.8 R^2_{adj} (model 1, model 2) = 0.14, 0.20 % concordant (model 1, model 2) = 68.1, 72.0
120 days or more	% staff in recovery OR=1.00 SDU matched patients to providers OR=0.83 SDU has case manager(s) OR=2.53 (1.49, 4.29)*** SDU tailors to populations OR=5.57 (2.24,13.81)*** SDU provides vocational training OR=3.00 (1.20,7.55)*** patient asks for changes to tx plan OR=0.32 (0.19,0.52)* patient saw treatment plan OR=2.19 (1.45,3.31)***	model improvement (model 1-model 2): 1049.54 - 768.54 = 281.0, DF=7, p<0.0001 % correct (model 1, model 2) - 54.8, 60.9 sensitivity (model 1, model 2) - 50.2, 76.8 specificity (model 1, model 2) - 56.6, 53.0 false+rate (model 1, model 2) - 69.2, 55.4 false - rate (model 1, model 2) - 25.3, 17.8 R^2_{adj} (model 1, model 2) = 0.05, 0.23 % concordant (model 1, model 2) = 61.5, 75.1

* Odds ratios significant at p<0.05

** Odds ratios significant at p<0.005

*** Odds ratios significant at p<0.001

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EXHIBIT III-5
WITHIN-CELL LOGISTIC REGRESSION MODELS

Intended Length of Treatment	Independent Variables Included in the Model	Model Fit
SHORT-TERM RESIDENTIAL		
21-30 days	average length of individual counseling sessions OR=0.95 SDU provides vocational training OR=1.76 patient saw treatment plan OR=4.43 (1.98,9.94)***	model improvement (model 1- model 2): 354.33 - 295.29 = 59.04, DF=3, $p<0.0001$ % correct (model 1, model 2) - 58.2, 67.5 sensitivity (model 1, model 2) - 60.0, 71.1 specificity (model 1, model 2) - 48.6, 45.8 false+rate (model 1, model 2) - 13.6, 11.2 false - rate (model 1, model 2) - 81.7, 79.2 R^2_{adj} (model 1, model 2) = 0.13, 0.18 % concordant (model 1, model 2) = 70.0, 74.1
LONG-TERM RESIDENTIAL		
120 days or more	SDU has case manager(s) OR=1.05 SDU provides vocational training OR=2.62 (1.51,4.54)*** patient saw treatment plan OR=8.83 (4.50,17.31)***	model improvement (model 1- model 2): 897.83 - 663.98 = 233.85, DF=3, $p<0.0001$ % correct (model 1, model 2) - 53.4, 64.6 sensitivity (model 1, model 2) - 51.8, 83.6 specificity (model 1, model 2) - 54.4, 49.7 false+rate (model 1, model 2) - 57.5, 43.5 false - rate (model 1, model 2) - 36.5, 20.5 R^2_{adj} (model 1, model 2) = 0.05, 0.25 % concordant (model 1, model 2) = 60.8, 73.4

* Odds ratios significant at p<0.05
** Odds ratios significant at p<0.005
*** Odds ratios significant at p<0.001

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EXHIBIT III-6
WITHIN-CELL LOGISTIC REGRESSION MODELS

CORRECTIONAL FACILITY

Intended Length of Treatment	Independent Variables Included in the Model	Model Fit
90-119 days	% of staff of ethnic or racial minority OR=7.64	model improvement (model 1-model 2): 155.73-145.75=9.98, DF=1, $p<0.005$ % correct (model 1, model 2) - 47.6, 50.0 sensitivity (model 1, model 2) - 46.9,43.8 specificity (model 1, model 2) - 48.3, 56.7 false+rate (model 1, model 2) - 50.8, 48.1 false - rate (model 1, model 2) - 54.0, 51.4 R^2_{adj} (model 1-model 2) = 0.16, 0.25 % concordant (model 1, model 2) = 69.1, 72.9
120 days or more	patient saw treatment plan OR=3.26 (1.40,7.60)*	model improvement (model 1-model 2): 236.50-217.77=18.73, DF=1, $p<0.0001$ % correct (model 1, model 2) - 57.7, 59.0 sensitivity (model 1, model 2) - 43.4, 51.9 specificity (model 1, model 2) - 61.7, 61.0 false+rate (model 1, model 2) - 75.8, 71.9 false - rate (model 1, model 2) - 20.5, 18.8 R^2_{adj} (model 1, model 2) = 0.11, 0.17 % concordant (model 1, model 2) = 68.5, 72.9

* Odds ratios significant at $p<0.05$

models containing only background variables ($p<0.005$). All of the models including background and independent variables exhibited higher adjusted generalized coefficients of determination (R^2_{adj}), and higher percent correct and percent concordant values. In addition, false positive and false negative rates were lower for these models. The greatest increase in R^2_{adj} was observed for the model with the background + independent variables in the long-term residential cell.

Whether the client reported seeing their treatment plan is by far the most predominant predictor of treatment completion. This independent variable was found to be significant in all of the models in which it was included. Taken at face value, this pattern might suggest that programs can increase their completion rates by raising the visibility of the treatment planning process to the client. Since this is something that programs clearly have the ability to do, it potentially represents a very significant finding. Before drawing this conclusion, however, plausible alternatives must be considered and, if possible, investigated.

We considered two alternative explanations for the effect of the patient saw treatment plan variable. First, there is the possibility that completers were more likely to report seeing their plans because they simply stayed longer. Treatment plans are often developed over a lengthy period, often as long as 90 days after admission (CSAT, 1994). Therefore, non-completers may have been less likely to see their treatment plan simply because they were more likely to leave before it was completed. To investigate this possible explanation, we first compared the distributions of completers and non-completers on length of stay within cells. While completers in each analysis cell stayed longer on average ($p<0.05$ for all cells), there was tremendous overlap across the two distributions. For example, 13 noncompleters in the 120 days or more long-term residential cell stayed longer than 240 days and 3 clients in the 90-119 day non-methadone outpatient cell "completed" in one day. Thus, this is not a simple case of non-completers routinely leaving earlier than completers. Next, we looked at the relationship between length of stay (LOS) and seeing a treatment plan. In each of the 5 cells where we found the effect of seeing a treatment plan on completion, seeing a plan was positively correlated with LOS as expected. However, these correlations were rather weak and differed based on completion status, see Exhibit III-7. If the relationship between the clients' recollections of having seen a treatment plan and completion was simply an artifact of the relationship between seeing the plan and LOS, the correlations should be observed for both completers and non-completers. Because the range of lengths of stay is similar across these two groups of clients for all analysis cells except short-term residential, the observation that completers who stay longer are not more likely to report having seen a treatment plan suggests that what is driving the effect

of the treatment plan variable is not merely a simple relationship between seeing the treatment plan and LOS.

EXHIBIT III-7
CORRELATIONS BETWEEN PATIENT SAW TREATMENT PLAN VARIABLE AND LENGTH OF STAY WITHIN ANALYSIS CELLS

ANALYSIS CELL	Those who did and did not complete treatment considered together:	Those who did and did not complete treatment considered separately:
non-methadone outpatient, 90-119 days intended length of treatment	$r = 0.15$ $p<0.021$	completers $r = -0.03$ $p<0.701$ non-completers $r = 0.21$ $p<0.021$
non-methadone outpatient, 120+ days intended length of treatment	$r = 0.19$ $p<0.0001$	completers $r = 0.04$ $p<0.594$ non-completers $r = 0.21$ $p<0.001$
short-term residential, intended length of treatment 21-30 days	$r = 0.16$ $p<0.0012$	completers $r = 0.14$ $p<0.007$ non-completers $r = 0.04$ $p<0.774$
long-term residential, 120+ days intended length of treatment	$r = 0.35$ $p<0.0001$	completers $r = 0.03$ $p<0.593$ non-completers $r = 0.36$ $p<0.001$
correctional facility, 120+ days intended length of treatment	$r = 0.27$ $p<0.0001$	completers $r = 0.01$ $p<0.999$ non-completers $r = 0.29$ $p<0.001$

The relationship between the SDU-level variable "time treatment plan developed" (B236) and client saw treatment plan was also investigated. For those clients for which this data was available, (all cells except short-term residential were missing 60 percent or more values for this variable) we found that most of the clients who had lengths of stay of 14 days or less and who were from SDUs that reported they usually develop treatment plans during the first 14 days after admission, responded that they had not seen a treatment plan. This pattern was consistent across all of the analysis cells exhibiting the client saw treatment plan effect with the exception of the short-term residential group. Furthermore, there are clients in this group in most cells who completed within a 14-day period and reported seeing a treatment plan as well as non-completers who stayed in treatment beyond this point who reported not seeing a treatment plan. This is inconsistent with what would be expected if the 'time treatment plan was developed' variable was responsible for the effect of seeing the treatment plan.

In order to determine the effect of the relationship between LOS and clients' recollections of having seen a treatment plan on the logistic regression results, LOS was added to the models

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for all cells. Including this variable had the effect of reducing the parameter estimates for the client saw plan variable in two of the analysis cells—the 120 days or more non-methadone outpatient and correctional cells. In both of these cases, the odds ratios were positive (ORs=1.46, 1.74) but not significant. However, all other significant independent variables in the models described in Exhibits III-4, III-5, and III-6 remained significant after the inclusion of LOS.

The second alternative explanation considered is that the 'patient saw treatment plan' finding could represent a reporting bias. That is, non-completers may have been less likely to recall seeing a treatment plan because they were less engaged in the treatment process generally. The data do not permit any investigation of this hypothesis, however.

Exhibit III-8 presents the results of the sensitivity analysis in which the non-completers in the models were restricted to those clients who were classified as having had definite negative exits from their programs. These data show that the within-cell regression results were not significantly affected by including those clients who were classified as having been transferred to another program, incarcerated, or as "other reason(s) for discharge."

EXHIBIT III-8
SENSITIVITY CHECK OF WITHIN-CELL LOGISTIC REGRESSION MODELS

INTENDED LENGTH OF TREATMENT	NON-METHADONE OUTPATIENT
90-119 days	Independent variables added to the model include: average length of individual counseling sessions OR=0.97 patient saw treatment plan OR=2.96 (1.16,7.53)*
120 days or more	Independent variables added to the model include: % staff in recovery SDU matched patients to providers OR=1.03 SDU has case manager(s) OR=2.79 (1.60, 4.85)** SDU tailors to populations OR=3.76 (1.47,9.57)** SDU provides vocational training OR=2.73 (1.07,6.98)* patient asks for changes to tx plan OR=0.37 (0.22,0.61)* patient saw treatment plan OR=2.24 (1.47,3.42)**
SHORT-TERM RESIDENTIAL	
21-30 days	Independent variables added to the model include: average length of individual counseling sessions OR=0.95 SDU provides vocational training OR=9.91 patient saw treatment plan OR=4.73 (2.08,10.74)**
LONG-TERM RESIDENTIAL	
120 days or more	Independent variables added to the model include: SDU has case manager(s) OR=1.10 SDU provides vocational training OR=2.40 (1.34,4.28)** patient saw treatment plan OR=9.68 (4.88,19.22)***
CORRECTIONAL FACILITY	
90-119 days	Independent variables added to the model include: % of staff in recovery OR=2.58
120 days or more	Independent variables added to the model include: patient saw treatment plan OR=2.98

* Odds ratios significant at $p<0.05$
** Odds ratios significant at $p<0.005$
*** Odds ratios significant at $p<0.001$

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IV. SUMMARY AND CONCLUSIONS

This section contains a statement of potential limitations of the analyses reported in this study. It also contains a discussion of the results of the analyses and implications for further research, policy, and treatment practice.

1. LIMITATIONS

Prior to the interpretation of the results, certain potential limitations should be considered. Intraclass correlation of observations (within SDU) were not addressed. First, because the analysis did not take this measure of homogeneity into account, variance terms may have been underestimated and the significance levels of the independent variables may thus be inflated. Second, SDUs differed considerably in their formal criteria for successful completion (e.g., client follows treatment plan, remains clean for a length of time, consistent attendance at follow-up meetings, changes in lifestyle, etc.). The influence of this factor on the results of the analysis is unknown. In addition, interactions between client-level and program-level factors were not investigated.

2. CONCLUSIONS

Notwithstanding these potential limitations, the descriptive comparisons of completion rates and median actual lengths of stay for the 8 analysis cells revealed some interesting findings. These results include:

- In general, shorter programs have higher treatment episode completion rates but longer programs retain clients for longer periods.
- The median actual lengths of stay for clients in programs with intended lengths of treatment of 120 days or more were lower than in the 90-119 day programs. This finding suggests that setting the intended length of treatment at 120 days or more may be counterproductive with respect to retaining clients.
- Among long-term programs (120 days or more intended length of treatment), residential programs exhibit higher completion rates than programs in non-methadone outpatient or correctional modalities.
- The results of the logistic regression analysis show that SDU-level factors clearly increase the odds of program completion and that the inclusion of SDU-level variables improved model fit in all the cells considered.

- The predominance of the effect of the 'patient saw treatment plan' variable across analysis cells suggests that engaging the client in the treatment plan development process may be an important determinant of treatment completion.

- Results from the 120 days or more non-methadone outpatient and long-term residential cells suggest that providing vocational training, at least within the context of a long-term program, may be another important determinant of treatment completion. Attending educational and vocational classes while in treatment has been found to be significantly related to retention. Simpson et al. (1997) reported that in the Drug Abuse Treatment Outcome Study (DATOS), the odds of staying in treatment for 90 days or longer in long-term residential programs increased sixfold if the client was enrolled in such classes. Thus, providing vocational training, either on- or off-site, in programs with long intended durations may be one way that programs could modify their service delivery to increase retention and thus the odds of treatment completion.

- Results from the 120 days or more non-methadone outpatient cell suggest that having staff specifically designated as case managers may be another determinant of treatment completion. Case management has been described as a process that focuses on the whole individual, "stresses comprehensive assessment, service planning, and service coordination, and advocacy to address multiple aspects of a client's life," (CSAT 1997). Research suggests that case management's effectiveness as an adjunct to substance abuse treatment is tied to patient retention (CSAT 1997). Case management's principal role is to keep clients engaged in treatment and moving toward recovery—in a sense, to facilitate retention (CSAT 1997). Given this, we might expect that the effect of having a case manager would have been detected in more than one analysis cell. One possible explanation for why the case manager effect was not stronger relates to the way in which the NBAR survey item was worded. The question merely asks if the SDU had a staff member who was specifically designated as a case manager. Absence of a case manager does not necessarily mean the absence of the provision of case management services. Nor does the presence of a case manager mean that all clients received case management services. Furthermore, the presence of such a staff member tells us nothing about the intensity of the services provided. Overall, this NBAR variable does not permit an optimal test of whether case management increases retention in substance abuse treatment programs.

- Results from this cell also indicate that having services tailored to specific populations, at least within the context of this type of program, may also be a predictor of treatment completion. Orwin et al. (1998), in their analysis of data from the NIAAA Cooperative Agreement Program, pointed out that increased responsiveness to client needs from the perspectives of the clients themselves is one factor that may have a positive impact on retention (e.g., increasing the cultural sensitivity to certain subgroups of the client population).

3. IMPLICATIONS FOR FURTHER RESEARCH, POLICY, AND PRACTICE

These results imply several avenues for further research:

- An investigation of interactions between client level variables and SDU-level variables (also among client-level variables and among SDU-level variables) is warranted.

- Future analyses should look closely at those clients who drop out in order to develop profiles of "early" and "late" leavers. Such an investigation may allow for predictions to be made and special attention paid to those who may be at risk of leaving the program early.

- Further work with this data set should also focus on why clients leave programs. Exploring the reasons for leaving treatment might provide insight into how programs could modify their service delivery to increase retention.

- Additional analyses should be carried out to determine whether there are there patterns in terms of when people leave their programs. If patterns are detected, programs could use this information to try to develop strategies to engage clients at critical times.

- Investigations that relate treatment episode completion and treatment outcomes (reduced substance abuse, etc.).

Implications for policy, particularly the assignment of priorities and the allocation of resources, that can be drawn from this research include the following:

- Consideration should be given to developing an intensive moderate-length (about 90 days) residential program. This program could include the elements now found in long-term residential programs but in a more intensive treatment regime. Our research shows that clients are more likely to finish the short-term residential program than the long-term programs. Furthermore, the average length of stay for the long-term residential program is 102.2 days. A moderate-length intensive residential program may prove a successful treatment approach.

- More attention should be paid on the impact of case management on client outcomes for NMO modalities. Is it necessary for a specific person to be designated as a case manager, or can a number of individuals assume this role? Is a case manager more important for certain types of clients than others? Does case management enhance or reduce delivered treatments?

An implication for treatment practice can be drawn from these results, as well. The positive effects of clients seeing their treatment plans needs to be explored. Client involvement in the treatment plan can vary. Clients can actively participate in its development and formally agree to it, or just review the plan passively. In spite of the ambiguity, allowing clients a role in their treatment plans appears to be a low-risk way to improve treatment completion in all modalities.

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APPENDIX

DESCRIPTION OF THE NATIONAL TREATMENT IMPROVEMENT EVALUATION STUDY AND CENTER FOR SUBSTANCE ABUSE TREATMENT DEMONSTRATIONS (1990-1992)

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DESCRIPTION OF THE NATIONAL TREATMENT IMPROVEMENT EVALUATION STUDY AND CENTER FOR SUBSTANCE ABUSE TREATMENT DEMONSTRATIONS (1990-1992)

The National Treatment Improvement Evaluation Study (NTIES) was a national evaluation of the effectiveness of substance abuse treatment services delivered in comprehensive treatment demonstration programs supported by the Center for Substance Abuse Treatment (CSAT). The NTIES project (1992-1997) was designed and performed for CSAT by the National Opinion Research Center at the University of Chicago with assistance from Research Triangle Institute. The NTIES project collected longitudinal data between FY 1992 and FY 1995 on a purposive sample of clients in treatment programs receiving demonstration grant funding from CSAT. Client-level data were obtained at treatment intake, at treatment exit, and 12 months after treatment exit. Service delivery unit (SDU) administrative and clinician (SDU staff) data were obtained at two time points, 1 year apart.

1. THE NTIES DESIGN

1.1 The Administrative/Services Component

The NTIES study design had two levels—an administrative or services component and a clinical treatment outcomes component. The administrative component was designed to assess how CSAT demonstration funds were used, what improvements in services were implemented at the program level, and what kind and how many programs and clients were affected by the demonstration awards. Four data collection instruments were used to gather administrative/ services data: the NTIES Baseline Administration Report (NBAR), the NTIES Continuing Administrative Report (NCAR), the NTIES Exit Log, and the NTIES Clinician Form (NCF).

The unit of analysis for the administrative component was the SDU, defined by CSAT as a single site offering a single level of care. The classification of *level of care* is based on three parameters:

- Facility type (e.g., hospital, etc.)
- Intensity of care (e.g., 24-hour, etc.)
- Type of service (e.g., outpatient, etc.).

An SDU could be a stand-alone treatment provider, or it could be one component of a multi-tiered treatment organization. For example, a large, county mental health agency may be the *organization* within which the SDU is located. The organization may have multiple substance abuse treatment components, such as a county hospital and a county (ambulatory) mental health center. The county hospital may have multiple SDUs, such as an inpatient detoxification service, an outpatient counseling service, and a hospital satellite center providing transitional care. In

summary, the SDU provided NTIES evaluators with a stable, uniform level of comparison for examining service delivery issues.

A range of key clinician-specific data elements (within the administrative component) were assessed using the NCF. The NCF items were an important adjunct to the facility- (SDU) level instruments; these items assessed clinician training, experience, client exposure, and service provision, and were completed by all counseling and clinical (medical and therapeutic) staff at the individual SDUs.

1.2 Clinical Treatment Outcomes Component

The unit of analysis for the clinical treatment outcomes component was individual client data. NTIES measured the clinical outcomes of treatment primarily through a "before/after" or "pre- to post-treatment" design. This method compares behaviors or other individual characteristics in the same participants, measured in similar ways, before and after an intervention.

Information about clients' lives for the *before* period were obtained from the NTIES Research Intake Questionnaire (NRIQ), which was administered sometime during the clients' first 3 weeks of treatment. The specific areas assessed included:

- Drug and alcohol use
- Employment
- Criminal justice involvement and criminal behaviors
- Living arrangements
- Mental and physical health.

Information about clients' lives for the *after* period were obtained from the NTIES Post-discharge Assessment Questionnaire (NPAQ), with the same areas assessed at roughly 12 months post-treatment. Other client data sources included a treatment discharge interview (NTIES Treatment Experience Questionnaire, NTEQ), abstracted client records, urine drug screens collected at the time of the follow-up interview, and arrest reports from state databases.

1.3 The Outcome Analysis Sample

Between August 1993 and October 1994, research staff successfully enrolled 6,593 clients at 71 SDUs to participate in three waves of an in-person, computer-assisted data collection protocol. These SDUs were chosen from the universe of treatment units receiving demonstration grant funding from CSAT. Some of the selected facilities were wholly supported by CSAT awards, while others received only indirect support or none.

Clients were interviewed three times: shortly after admission on their first day of treatment, when they left treatment, and 12 months after the end of treatment. Less than 10 percent of the eligible clients refused or avoided participation, and more than 83 percent of the recruited individuals (5,388 clients) completed a follow-up interview. Additional sample exclusions included:

- Missing or undetermined treatment exit date
- Inappropriate length of follow-up interval (less than 5 or more than 16 months)
- Clients incarcerated for most or all of the follow-up period (nearly all had been treated while incarcerated, and were not yet released).

The additional sample exclusions resulted in a final outcome analysis sample of 4,411 individuals.

2. TREATMENT DEMONSTRATION PROGRAMS

CSAT initiated three major demonstration programs and made 157 multi-year treatment enhancement awards across 47 states and several territories during 1990 through 1992. One objective common to all demonstrations was CSAT's emphasis on the provision of "comprehensive treatment" services to targeted client populations. The recipients of these awards focused special attention on the substance abuse treatment service needs of minority and special populations located primarily within large metropolitan areas. The demonstration programs are briefly described below.

2.1 Target Cities

Under this demonstration, nine metropolitan areas were selected to receive awards, of which half were included in the NTIES purposive sample. The following treatment improvement activities were explicitly provided for in the awards:

- Establishment of a Central Intake Unit (CIU) with automated client tracking and referral systems in place
- Provision of comprehensive services, including vocational, educational, biological, psychological, informational, and lifestyle components
- Improved inter-agency coordination (e.g., mental health, criminal justice, and human service agencies)
- Services for special populations—adolescents, pregnant and postpartum women, racial and ethnic minorities, and public housing residents.

2.2 Critical Populations

Under this demonstration program, awardees were required to implement "model enhancements" to existing treatment services for one or more of the following critical populations: racial and ethnic minorities, residents of public housing, and/or adolescents. Special emphasis was given to services provided to the homeless, the dually diagnosed, or persons living in rural areas. A total of 130 grants were awarded, covering services such as vocational support/counseling, housing assistance, integrated mental health and/or medical services, coordinated social services, culturally directed services, and others.

2.3 Incarcerated and Non-Incarcerated Criminal Justice Populations

Under this demonstration program, funds were directed toward improving the standard of comprehensive treatment services for criminally involved clients in correctional and other settings. Some program emphasis was placed on ethnic and/or racial minorities. Nine correctional setting demonstrations were funded: five in prisons, three in local jails, and one across a network of juvenile detention facilities. All projects included a screening component to identify substance-abusing inmates, a variety of targeted treatment interventions (e.g., therapeutic communities, intensive day treatment programs), and a substantial aftercare component.

A total of 10 non-incarcerated projects were funded. Five programs targeted interventions at clients in diversionary programs, three focused services on probationers or parolees, and two programs targeted both populations. Almost all of the funded demonstration projects included the following components:

- Basic eligibility determination, followed by systematic screening and assessment
- Referral to treatment
- Graduated sanctions and incentives while in treatment
- Intensive supervision in treatment
- Community-based aftercare with supervision and service coordination.

In total, 19 criminal justice projects were funded as part of the CSAT 1990-1992 demonstrations, and as indicated in the next section, these projects were purposively over-sampled in order to obtain a more robust evaluation of this program.

3. DESCRIPTION OF SDUS AND CLIENTS BY TREATMENT MODALITY AND PROGRAM TYPE

The 71 SDUs contributing clients to the outcome analysis sample are characterized by modality and (demonstration) program type in Exhibit A-1 below. Among the 698 SDUs in the NTIES universe: 52 percent (n=365) were Target Cities programs, 39 percent (n=274) were Critical Populations programs, and 9 percent (n=59) were Criminal Justice programs.

In terms of the SDUs sampled for the NTIES outcome analysis, 44 percent were Target Cities programs, 38 percent were Critical Populations programs, and 23 percent were Criminal Justice programs. Criminal Justice SDUs were purposely over-sampled as part of the NTIES evaluation design (CSAT, 1997). Nearly half of the sampled SDUs were (non-methadone) outpatient programs, and about one-quarter were long-term residential programs.

As shown in Exhibit A-2, 59 percent of all NTIES clients were sampled from Target Cities SDUs. Slightly over 21 percent of all NTIES clients were sampled from Critical Populations SDUs, and 20 percent were sampled from Criminal Justice SDUs. Outpatient (non-methadone) SDUs treated over one-third (35%) of the clients in the outcomes analysis sample, and almost 80 percent of these were sampled from Target Cities programs.

Readers who are interested in more detailed information about the NTIES project are invited to visit the NEDS Web site at: http://neds.calib.com. The NEDS Web site provides the full-length version of the NTIES Final Report (1997), as well as copies of all data collection instruments employed in NTIES.

EXHIBIT A-1
SDUs IN THE OUTCOME ANALYSIS SAMPLE

Program Title Number of SDUs (% of NTIES Universe)[1]	NTIES Sample	Methadone	Outpatient	Long-Term Residential	Short-Term Residential	Correctional
Target Cities n=365 (52%)	31 (44%)	6	15	6	4	0
Critical Populations n=274 (39%)	27 (38%)	1	13	10	3	0
Criminal Justice n=59 (9%)	13 (23%)	0	5	0	0	8
Totals N=698 (100%)	71 (100%)	7	33	16	7	8

EXHIBIT A-2
DISTRIBUTION OF CLIENTS IN THE OUTCOMES ANALYSIS SAMPLE

Program Title Number of Clients (% of Analysis Sample)	Methadone	Outpatient	Long-Term Residential	Short-Term Residential	Correctional
Target Cities n=2,600 (59%)	377 (89%)	1,214 (78%)	504 (60%)	505 (58%)	0
Critical Populations n=931 (21%)	45 (11%)	220 (14%)	298 (35%)	368 (42%)	0
Criminal Justice n=880 (20%)	0	132 (8%)	39 (5%)	0	709 (100%)
Totals n=4,411 (100%)	422	1,566	841	873	709

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[1] The original NTIES universe of SDUs included a program type called *Specialized Services*. Because clients for the outcome analysis sample were not drawn from these SDUs (n=94), they are excluded from the Exhibit.